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(54) COLOR TONER FOR DEVELOPING ELECTROSTATIC CHARGE IMAGE,
DEVELOPER AND IMAGE PRODUCING METHOD

(57)Abstract:

PURPOSE: To obtain a color toner capable of maintaining a color image excellent in fixing characteristics and image quality such as image density and fog and not causing the scattering of the toner even in the case of high-speed printing or at the time of repetitive use over a long time.

CONSTITUTION: This color toner contains vinyl resin contg. ≥ 3 wt.% component having a mol.wt. of $\leq 1,000$ in chromatogram by gel permeation chromatography as a vinyl polymer obtd. by polymerizing a vinyl monomer, a nonmetallic quat. ammonium salt, a metal-contg. quat. ammonium salt whose anion part has a metallic complex structure and a colorant.

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CLAIMS

[Claim(s)]

[Claim 1] The color toner for electrostatic-charge image development which comes to contain the metal content quarternary ammonium salt and the coloring agent whose vinyl system resin [which contains a with a molecular weight of 1000 or less component 3% of the weight or more in a resin by the chromatogram in a gel permeation chromatography], nonmetallic quarternary-ammonium-salt, and anion section it is the vinyl system resin obtained by carrying out the polymerization of the vinyl system monomer, and is metal complex structure.

[Claim 2] The color toner for electrostatic-charge image development according to claim 1 whose vinyl system resin is what has at least one peak to a with a molecular weight of 1000 or less field by the chromatogram in a gel permeation chromatography.

[Claim 3] The color toner for electrostatic-charge image development according to claim 1 or 2 whose ratio (Mw/Mn) of the weight average molecular weight (Mw) and number average molecular weight (Mn) of tetrahydrofuran extractives a vinyl system resin is 20 or more.

[Claim 4] The color toner for electrostatic-charge image development according to claim 1, 2, or 3 whose metal atom of the metal content quarternary ammonium salt whose anion section is metal complex structure is molybdenum.

[Claim 5] The color toner for electrostatic-charge image development according to claim 1, 2, 3, or 4 which is what is obtained by a vinyl system resin carrying out the polymerization of the monomer mixture containing a maleic-acid dialkyl, a fumaric-acid dialkyl, and/or an itaconic-acid dialkyl.

[Claim 6] The color toner for electrostatic-charge image development according to claim 1, 2, 3, 4, or 5 which is what is obtained by a vinyl system resin carrying out the polymerization of the monomer mixture containing a cross linking agent.

[Claim 7] The color toner for electrostatic-charge image development according to claim 1, 2, 3, 4, or 5 which is the resin obtained by a vinyl system resin carrying out the polymerization of the monomer mixture containing a dibutyl maleate and/or a fumaric-acid dibutyl, and a cross linking agent.

[Claim 8] The color toner for electrostatic-charge image development according to claim 1 to 7 whose vinyl system resin is a styrene-acrylic resin.

[Claim 9] The color toner for electrostatic-charge image development according to claim 1 to 8 whose vinyl system resin is what is obtained according to a suspension polymerization.

[Claim 10] The developer which consists of the color toner for electrostatic-charge image development and a carrier according to claim 1 to 9.

[Claim 11] The developer according to claim 10 whose carrier is a ferrite or a magnetite.

[Claim 12] The developer according to claim 10 or 11 by which a carrier is covered by the resin.

[Claim 13] The developer according to claim 12 whose resin to cover is a fluorine system resin.

[Claim 14] The developer according to claim 10, 11, 12, or 13 whose electrical resistivity of a developer is $10^8 - 3 \times 10^{10}$ ohm-cm.

[Claim 15] The picture manufacture method characterized by using the color toner for electrostatic-charge image development or a developer according to claim 10 to 14 according to claim 1 to 9.

[Claim 16] The picture manufacture method according to claim 15 using what contains the amorphous metal photoconductivity matter as a photo conductor.

[Claim 17] The picture manufacture method according to claim 16 that the amorphous metal photoconductivity matter is a selenium.

[Claim 18] The picture [peripheral speed] using thing 20cm [/second] or more as photo conductor manufacture method according to claim 15, 16, or 17.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] this invention relates to the developer and the picture manufacture method using the color toner for electrostatic-charge image development and this color toner which develop the electrostatic-charge image formed in the photo conductor front face in electrophotography, electrostatic recording, etc.

[0002]

[Description of the Prior Art] An electrophotography method as indicated by the U.S. Pat. No. 2,297,691 specification, the British patent No. 1,165,406 specification, and the 1,165,405 specification The electrification process which gives uniform electrostatic charge to up to the photo conductor using the photoconductivity matter, The exposure process in which irradiate light and an electrostatic latent image is made to form, the development process which makes a toner adhere to a latent-image portion, The imprint process which a toner image base material is made to imprint, the fixing process which makes an image base material fix this toner image with heat, a pressure, flash plate light, etc., It consists of an electric discharge process returned to an initial state except for the electrostatic charge on the cleaning process which removes the toner which remained on the photo conductor, and a photo conductor, these processes are repeated, and how many sheet thing printed matter is obtained.

[0003] As a dry type toner for electrostatic-charge image development used for the field of electrophotography The toner using polystyrene resin (JP,44-16118,B), The toner using styrene-acrylic resin, such as a toner (JP,56-11143,B) using the styrene-methacrylic-acid butyl copolymerization resin The toner using the bisphenol type epoxy resin which a bisphenol and epichlorohydrin are made to react and is obtained (JP,57-96354,A), Although the toner (JP,52-25420,B) using the polyester resin which the glycol and polybasic acid which have a bisphenol skeleton are made to react, and is obtained etc. is known A styrene-acrylic resin can operate broadly resin physical properties, such as molecular weight, a glass transition point, and melt viscosity, compared with other resins, and on the design of a toner, since it is very advantageous, most toners are occupied with the toner which used this styrene-acrylic resin.

[0004]

[Problem(s) to be Solved by the Invention] In the field of the copying machine using electrophotography, electrostatic recording, etc. in recent years, and a printer, multicolor picture quality has come to be required in connection with informational diversification and informational densification. Since it corresponds to this demand, as for the hue of a toner, colors other than black have been called for. Since a precise color tone is required, a color toner (toner of colors other than black) has the restrictions from a color tone side also in the raw material to be used. From there being such no restrictions, in the case of the conventional black toner, various raw materials could be used, and it was able to prepare the toner property comparatively easily. However, in the color toner, since only the raw material of colorlessness or light color was able to be used except for the pigment to be used, it was very difficult to develop a black toner and the color toner which has the performance of this level. Furthermore, especially in a printer and a copying machine with a high-speed speed to print, it is serious

and the actual condition is that a still usable color toner is not obtained. this invention offers the color toner and developer which solve such a problem, and are excellent in picture quality, such as picture concentration and a fogging, and are excellent also in a fixing property. Moreover, picture quality is maintained also in repeat use and the long lasting color toner and long lasting developer which toner scattering does not occur but show a good fixing property over a long period of time are offered. Furthermore, the color toner and developer which are excellent in the environmental stability under high humidity, and can be equal also to high-speed printing are offered. Moreover, this invention offers the picture manufacture method using an above-mentioned color toner and an above-mentioned developer. [0005]

[Means for Solving the Problem] That is, this invention relates to the developer which consists of the color toner for electrostatic-charge image development and this color toner which come to contain the metal content quarternary ammonium salt and the coloring agent whose vinyl system resin [which contains a with a molecular weight of 1000 or less component 3% of the weight or more in a resin by the chromatogram in a gel permeation chromatography (it be hereafter written as GPC)], nonmetallic quarternary-ammonium-salt, and anion section it is the vinyl system resin obtained by carrying out the polymerization of the vinyl system monomer, and is metal complex structure, and an

[0006] Although the aforementioned vinyl system resin which is the binding resinous principle of the color toner for electrostatic-charge image development of this invention carries out the polymerization of the vinyl system monomer (mixture) and is obtained, since its toner property is good, a styrene-acrylic resin is used as a desirable thing. Here, a styrene-acrylic resin means the copolymer obtained by carrying out the polymerization of the vinyl monomer which uses a styrene system monomer and an acrylic monomer (derivatives, such as an acrylic acid, methacrylic acids, and those ester) as an indispensable component (it considers as 50% of the weight or more of a principal component to all monomers preferably). As the aforementioned styrene system monomer, styrene derivatives, such as a divinylbenzene which serves as styrene, an alpha methyl styrene, p-methyl styrene, p-t-butyl styrene, p-crawl styrene, hydroxy styrene, etc. and a cross linking agent, for example, are mentioned.

[0007] As an acrylic monomer, a methacrylic acid, a methyl methacrylate, an ethyl methacrylate, A methacrylic-acid propyl, methacrylic-acid butyl, a methacrylic-acid pentyl, A methacrylic-acid hexyl, a methacrylic-acid heptyl, a methacrylic-acid octyl, A methacrylic-acid nonyl, a methacrylic-acid desyl, a methacrylic-acid undecyl, A methacrylic-acid dodecyl, a glycidyl methacrylate, methacrylic-acid methoxy ethyl, Methacrylic-acid propoxy ethyl, methacrylic-acid butoxy ethyl, a methacrylic-acid methoxy diethylene glycol, A methacrylic-acid ethoxy diethylene glycol, methacrylic-acid methoxy ethylene glycol, A methacrylic-acid butoxy triethylene glycol, a methacrylic-acid methoxy dipropylene glycol, Methacrylic-acid phenoxy ethyl, a methacrylic-acid phenoxy diethylene glycol, A methacrylic-acid phenoxy tetraethylene glycol, a methacrylic-acid benzyl, Cyclohexyl methacrylate, methacrylic-acid tetrahydrofurfuryl, Methacrylic-acid JISHIKURO pentenyl, methacrylic-acid JISHIKURO pentenyl oxy-ethyl, A methacrylic-acid N-vinyl-2-pyrrolidone, a methacrylonitrile, methacrylamide, N-methylol methacrylamide, methacrylic-acid phthalimide ethyl, A methacrylic-acid phthalimide propyl, methacrylic-acid morpholino ethyl, A methacrylic-acid morpholino propyl, dimethylaminoethyl methacrylate, A methacrylic-acid diethylaminoethyl, diacetone methacrylamide, An acrylic acid, a methyl acrylate, an ethyl acrylate, an acrylic-acid propyl, A butyl acrylate, an acrylic-acid pentyl, an acrylic-acid hexyl, a butyl acrylate, An acrylic-acid octyl, an acrylic-acid nonyl, an acrylic-acid desyl, an acrylic-acid undecyl, An acrylic-acid dodecyl, metaglycidyl acrylate, acrylic-acid methoxy ethyl, Acrylic-acid propoxy ethyl, acrylic-acid butoxy ethyl, an acrylic-acid methoxy diethylene glycol, An acrylic-acid ethoxy diethylene glycol, acrylic-acid methoxy ethylene glycol, An acrylic-acid butoxy triethylene glycol, an acrylic-acid methoxy dipropylene glycol, Acrylic-acid phenoxy ethyl, an acrylic-acid phenoxy diethylene glycol, An acrylic-acid phenoxy tetraethylene glycol, an acrylic-acid benzyl, Acrylic-acid cyclohexyl, acrylic-acid tetrahydrofurfuryl, acrylic-acid JISHIKURO pentenyl, Acrylic-acid JISHIKURO pentenyl oxy-ethyl, an acrylic-acid N-vinyl-2-pyrrolidone, Metaglycidyl acrylate, acrylonitrile, an acrylamide, N-methylol acrylamide, Diacetone acrylamide, a vinylpyridine, acrylic-acid phthalimide ethyl, An acrylic-acid phthalimide propyl, acrylic-acid morpholino ethyl, an acrylic-acid

morpholino propyl, The monomer which has one vinyl group in 1 molecules, such as acrylic-acid dimethylaminoethyl and an acrylic-acid diethylaminoethyl A resultant with the glycol, methacrylic acid, or acrylic acid used as a cross linking agent, For example, ethylene glycol dimethacrylate, 1, 3-butylene-glycol dimethacrylate, 1, 4-butanediol dimethacrylate, 1,5-pentanediol dimethacrylate, 1, 6-hexanedioldimethacrylate, neopentyl glycol dimethacrylate, Diethylene-glycol dimethacrylate, triethylene-glycol dimethacrylate, Polyethylene glycol dimethacrylate, tripropylene glycol dimethacrylate, Hydroxy pivalate neopentyl glycol-ester dimethacrylate, Trimethylolethane trimethacrylate, trimethylolpropanetrimethacrylate, Pentaerythritol trimethacrylate, pentaerythritol tetrapod methacrylate, Tris METAKURIROKISHI ethyl phosphate, screw (methacryloiloxy-ethyl) hydroxyethyl isocyanurate, Tris (methacryloiloxy-ethyl) isocyanurate, ethylene glycol diacrylate, 1, 3-butylene-glycol diacrylate, 1, 4-butanediol diacrylate, 1,5-pentanediol diacrylate, 1, 6-hexanediol diacrylate, Neopentyl glycol diacrylate, diethylene glycol diacrylate, Triethylene glycol diacrylate, polyethylene-glycol diacrylate, Tripropylene diacrylate, hydroxypivalate neopentylglycol acrylate, Trimethylol triacrylate, trimethylolpropane triacrylate, A pentaerythritol thoria chestnut rate, pentaerythritol tetraacrylate, The monomer which has two or more vinyl groups is in 1 molecules, such as tris acryloxy ethyl phosphate, screw (methacryloiloxy-ethyl) hydroxyethyl isocyanurate, and tris (methacryloiloxy-ethyl) isocyanurate.

[0008] Furthermore, in order to prevent toner adhesion in elasticity chlorination plastic sheeting, it is desirable to use the vinyl monomer which has a hydroxyl. As a corresponding monomer, methacrylic-acid 2-hydroxyethyl, methacrylic-acid 2-hydroxypropyl, A methacrylic-acid 2-hydroxy-3-phenyloxy propyl, methacrylic-acid 2-hydroxy butyl, A half esterification object with a glycidyl methacrylate, a methacrylic acid, or an acrylic acid, A half esterification object with a bisphenol type epoxy resin, a methacrylic acid, or an acrylic acid, There are acrylic monomers, such as acrylic-acid 2-hydroxyethyl, acrylic-acid 2-hydroxypropyl, an acrylic-acid 2-hydroxy-3-phenyloxy propyl, and acrylic-acid 2-hydroxy butyl. In addition, when the electrification nature under highly humid (more than about 60% RH) and a blocking resistance are required, the vinyl monomer which has the hydroxyl of the second class, for example, methacrylic-acid 2-hydroxypropyl, a methacrylic-acid 2-hydroxy 3-phenyloxy propyl, methacrylic-acid 2-hydroxy butyl, methacrylic-acid 3-hydroxy butyl, acrylic-acid 2-hydroxypropyl, an acrylic-acid 2-hydroxy 3-phenyloxy propyl, acrylic-acid 2-hydroxy butyl, acrylic-acid 3-hydroxy butyl, etc. can be used preferably. It is desirable from the property side of the resin with which methacrylic-acid 2-hydroxypropyl and acrylic-acid 2-hydroxypropyl are obtained especially. the inside of the total amount of the monomer in which especially the vinyl monomer that has the hydroxyl of the second class has a hydroxyl -- more than 80 mol % -- it is desirable to use it As for the monomer which has a hydroxyl, it is desirable to be blended so that the hydroxyl value of a polymer may be set to 80-250.

[0009] Moreover, especially since a picture property will improve if vinyl system monomers, such as itaconic-acid dialkyls, such as fumaric-acid dialkyls, such as maleic-acid dialkyls, such as a dibutyl maleate, and a fumaric-acid dibutyl, and an itaconic-acid dibutyl, are used together as a monomer component, it is desirable. As a desirable thing, styrene, a styrene derivative, a methacrylic ester, an acrylic ester, a maleic-acid dialkyl, a fumaric-acid dialkyl, and an itaconic-acid dialkyl are in 1 molecule among these vinyl system monomers by some which have one vinyl group. Moreover, as a monomer (cross linking agent) which has two or more vinyl groups in 1 molecule, the dimethacrylate and diacrylate of a divinylbenzene and the alkylene glycol of 2-6 carbon atomic numbers are desirable.

[0010] The alkyl ester of the methacrylic acid which has 1-5 carbon atoms especially in styrene and an alkyl group, or an acrylic acid is made into a principal component. A maleic-acid dialkyl, a fumaric-acid dialkyl, and/or an itaconic-acid dialkyl (especially preferably a dibutyl maleate and/or a fumaric-acid dibutyl) are used. And fixing intensity [as opposed to change of fixing temperature and picture concentration in the mixed stock using a cross linking agent (especially preferably divinylbenzene)], Since it excels in respect of the stability of offset-proof nature and excels in the dispersibility of this electrification control agent also in the system which used the electrification control agent of the minute amount which is the feature of this invention further, it is desirable. As for a maleic-acid dialkyl, a

fumaric-acid dialkyl, and/or an itaconic-acid dialkyl, it divides in respect of improvement of fixing intensity and offset-proof nature and is desirable [a cross linking agent] among [all] a monomer to use it 0.1 to 5.0% of the weight among [all] a monomer 0.05 to 1.0% of the weight.

[0011] Although the polymerization of the aforementioned vinyl system monomer mixture can be carried out by various polymerization methods and it can consider as a vinyl system resin, it is desirable to carry out a polymerization by the suspension-polymerization method. This reason can be manufactured easily and stably, since it does not need excelling also in respect of economical efficiency, and deliquoring processing, it is good, and it is because there are advantages, like that it is hard to generate the phenomenon (toner filming) in which a toner adheres to a photo conductor, and the electrification nature of a resin can lessen the amount of the electrification control agent highly blended with a toner. [of the shelf life when considering as a toner] On the occasion of a polymerization, as a polymerization initiator used An acetyl peroxide, peroxidation decanoyl, a lauroyl peroxide, a benzoyl peroxide, A peroxidation p-chloro benzoyl, peroxidation 2, 4-dichlorobenzoyl, A fault II carbonic acid diisopropyl, a fault II carbonic acid G 2-ethyl-hexyl, acetyl cyclohexane sulfonyl peroxide, Peracetic-acid tert-butyl, fault isobutyric-acid tert-butyl, an azobisisobutyronitril, Well-known things, such as the 2 and 2'-azobis -2, 4-dimethylvaleronitrile, 2, and 2'-azobis-4-methoxy -2, 4-dimethylvaleronitrile, fault 2-ethyl hexanoic-acid tert-butyl, and perbenzoic-acid tert-butyl, are mentioned. As for these, it is desirable to be used at 0.1 - 15 % of the weight to the total amount of a monomer. Moreover, as for these, it is desirable to use it, dissolving in a monomer. The polymerization of the above-mentioned vinyl system resin is performed until a polymerization is completed substantially (i.e., until conversion will not increase any more).

[0012] In this invention, it is required for the above-mentioned vinyl system resin obtained in this way to contain a with a molecular weight of 1000 or less component 3% of the weight or more in a resin by the chromatogram of GPC of tetrahydrofuran (THF) extractives. It is contained especially five to 20% of the weight preferably 5% of the weight or more. When a with a molecular weight of 1000 or less component is less than 3 % of the weight, the fixing nature of the toner to an image base material is inferior, or It becomes inadequate uniform distributing to the inside of the resin of a coloring agent, an electrification control agent, and other additives. As a result of the electrification properties between each toner particle differing, the quality of the picture which formed the image to the image base material tends to become low grade -- concentration is low or the so-called fogging phenomenon in which a toner adheres to the white section (non-picture section) occurs. On the other hand, as for making it contain exceeding 20 % of the weight, the preservation stability of a toner tends to become bad. Moreover, as for a with a molecular weight of 1000 or less component, it may be desirable that it is what has at least one peak to this field of a chromatogram, and you may have one more or more shoulders. In addition, the molecular weight of GPC used in this invention is the reduced property which used the standard polystyrene calibration curve. Although there is especially no limit in the method of manufacturing such a vinyl system resin, a maleic-acid dialkyl, a fumaric-acid dialkyl, and/or an itaconic-acid dialkyl can be used 0.1 to 5.0% of the weight among [all] a monomer, and it can manufacture by using a cross linking agent together further, for example.

[0013] Moreover, as for the vinyl system resin used by this invention, it is [20 or more] desirable that the ratio (Mw/Mn) of the weight average molecular weight (Mw) and number average molecular weight (Mn) of THF extractives is adjusted to 20-100 especially preferably. When Mw/Mn is less than 20, the uniform distribution to the binding resin of an electrification control agent does not often change. An electrification control agent twists rarely [predetermined *****], and too little [excessive or] toner particle generates. They serve as a high electrification toner, and low electrification or a reverse electrification toner, and induce sensitively the potential-defect of the organic photoconductivity matter, and the minute defect by the mechanical shock or discharge breakdown. it is discovered as a picture defect, or A color toner may not be developed faithfully, the development nature may be inferior, or the color toner picture on the latent image of a photo conductor may be unable to shift to the latent image of a photo conductor easily at an image base material at the time of a belt imprint. Moreover, in order not to sympathize with a latent-image electric potential gradient normally, it adheres in addition to the

imaging section of a photo conductor, and there are the cause and bird clapper with poor fall and cleaning of picture quality. Naturally, if recycling use of the ***** color toner is carried out, the picture will tend to serve as low grace. Moreover, it is easy to generate toner scattering and this has a problem and a bird clapper also on safety, health, and the financial side. As for such a phenomenon, an electrification control agent appears in 0.1 or less % of the weight of a case notably in a toner. Since a toner furthermore turns minutely by the shock with a carrier, and friction with a container and it becomes impossible to maintain a setting toner property, a bird clapper has repeat use difficult over a long period of time which is one of the purposes of this invention. Such a resin can be obtained by the method of manufacturing previously a well-known method, for example, a low molecular weight constituent, or the amount component of macromolecules, and manufacturing the amount component of macromolecules, or a low molecular weight constituent under the existence subsequently. As for the glass transition temperature of the aforementioned vinyl system resin, being adjusted by 35-100 degrees C is desirable, and it is desirable to be especially adjusted by 50-90 degrees C. At less than 35 degrees C, a toner tends to cause [a glass transition temperature] blocking (phenomenon which a toner particle condenses and becomes a lump) in the storage time or a developing machine. On the other hand, if a glass transition temperature exceeds 100 degrees C, when it will be in the inclination for fixing nature etc. to fall and a toner will be manufactured at the process of melting kneading, pulverization, and a classification, time is spent on a pulverization process and it is in the inclination for productive efficiency to fall. The color toner of this invention sets, two or more kinds of above-mentioned vinyl system resins are combined, it is good also as a binding resin and one or more sorts of other resins may be used together to the grade which does not spoil the effect of this invention other than the above-mentioned vinyl system resin.

[0014] As other resins, KR-216, KR-220, KR-152, KR-271, KR-255 (above Shin-Etsu Chemical Co., Ltd. make), Silicone resin, such as SR-2400, SR-2406, and SH-840 (above product made from Toray Industries Silicone), The norbornene system polymer of 1-SOREKKUSU (product made from CdF KEMIKKU), C-200A, Polyester carbonate, such as C-250A (above Mitsubishi Kasei Corp. make) and the you pyrone P-1000 (Mitsubishi Gas Chemical Co., Inc. make), Xylene resins, such as rig Norian R-70, R-120, R-140, and P-2 (above product made from Lignite), Epicoats 1004, 1007, 1009, and 1010 and YL- 903, 906, and Epicoat 604 (above shell company make) -- Epoxy resins, such as EPOMIKKU R304, R307, and R309 (above Mitsui Petrochemical Industries, Ltd. make), NIPPORU BR-1220, 1032 and 1441, NIPPORU IR 2200, NIPPORU NBR Diene system resins, such as 2057S and 2007J (above Nippon Zeon Co., Ltd. make), PC-RESIN 2H, 3H, 8H, and 11A (above Hitachi Chemical Co., Ltd. make), ATR 2005, 2009, and 2010, HTR-1, HTR-2 (above Kao Corp. make), The polyester resin of marketing, such as FC 017, 034, 035, and 036 (above product made from Mitsubishi Rayon) There are phenol resin, a terpene resin, cumarone resin, an amide resin, an amide imide resin, a butyral resin, amino resin, a urethane resin, an ethylene vinylacetate copolymer, an ethylene acrylic ester copolymer, etc. It is desirable to make the aforementioned vinyl system resin into a principal component (especially 100 - 70 % of the weight), and to use other resins in 0 - 30% of the weight of an amount as a binding resin in this invention.

[0015] As for this binding resin, it is desirable to be blended 60 to 95% of the weight into a color toner. When this amount has the weak toner binding capacity to a toner image base material and bent or rubs a toner image base material at less than 60 % of the weight, lack of a toner image takes place and it is easy to become a printing obstacle. On the other hand, when a binding resin exceeds 95 % of the weight, it is in the inclination which becomes ***** by the shortage of an obliterating power of a color toner image. At least two kinds of electrification control agents of the metal content quarternary ammonium salt (it is only written as metal content quarternary ammonium salt below) nonmetallic quarternary ammonium salt and whose anion section are metal complex structures are added in a toner by the toner of this invention. Especially as a metal atom of metal content quarternary ammonium salt, the point of an electrification property and a color tone to molybdenum is desirable.

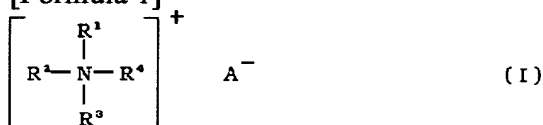
[0016] As for nonmetallic quarternary ammonium salt and metal content quarternary ammonium salt, it is desirable to contain in 0.1 - 4% of the weight of an amount to a toner, respectively, and it is desirable

to contain in 0.5 - 3% of the weight of an amount especially. Since the amount of nonmetallic quarternary ammonium salt cannot be quickly charged easily at less than 0.1 % of the weight, it tends to cause scattering in early stages of mixture of a toner and a carrier, and as for a toner, the amount of metal content quarternary ammonium salt tends to cause toner scattering with progress of printing at less than 0.1 % of the weight. Moreover, even if each amount uses it exceeding 4 % of the weight, improvement beyond it is not found.

[0017] Moreover, the total amount of an electrification control agent has 1 - 5 desirable % of the weight to a toner. At less than 1 % of the weight, when it is easy to cause toner scattering and, on the other hand, exceeds 5 % of the weight, problems, such as fixing nature and an environment-resistant fall, may arise. Furthermore, as for the ratio of nonmetallic quarternary ammonium salt and metal content quarternary ammonium salt, it is desirable on a toner property that it is 2:1-1:2 in a weight ratio.

[0018] Anion A- [in / the following general formula (I) / in a thing desirable as nonmetallic content quarternary ammonium salt used for this invention] is the thing of nonmetallic ion, and anion A- / in / the following general formula (I) / in a thing desirable as metal content quarternary ammonium salt] is the thing of metal complex structure.

[Formula 1]

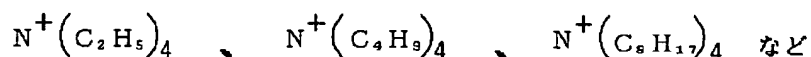
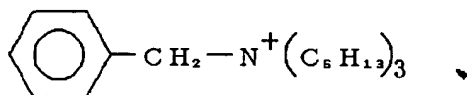
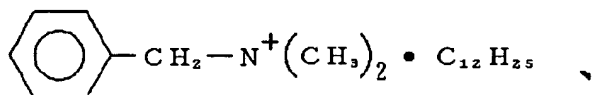
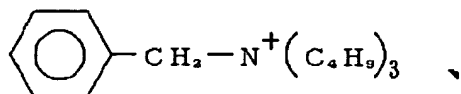
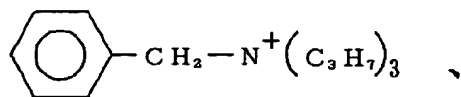
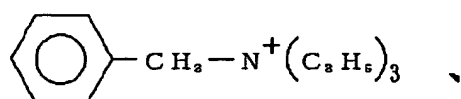


(R1, R2, R3, and R4 are the alkyl group which may have the substituent independently, respectively, an aryl group, an aralkyl machine, an alkenyl machine, etc. among a formula, and A- is an anion)

Anion A- in nonmetallic quarternary ammonium salt A chloride ion, bromine ion, iodine ion, a sulfate ion, a nitrate ion, Perchloric acid ion, boric-acid ion, phosphoric-acid ion, organic phosphoric-acid ion, Organic sulfonic-acid ion, such as benzoic-acid ion, naphtholsulfonic acid ion, and Para toluenesulfonic acid ion, There is carboxylic-acid ion etc., especially organic sulfonic-acid ion, such as naphtholsulfonic acid ion and Para toluenesulfonic acid ion, is desirable. in metal content quarternary ammonium salt A molybdic acid, a tungstic acid, a molybdophosphoric acid, a cay molybdic acid, What there are a tungstophosphoric acid, a tungstosilicic acid, a cay tungsten molybdic acid, a phosphorus tungsten molybdic acid, a chromium molybdic acid, a chromium tungstic acid, etc., and contains molybdenum is desirable. A carbon atomic number has [R1, R2, R3, and R4] the desirable thing of 1-30.

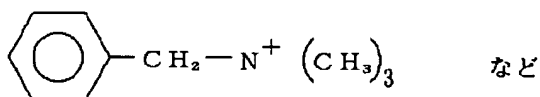
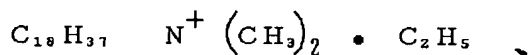
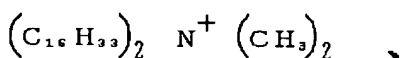
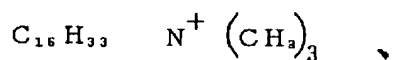
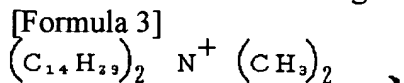
[0019] The cation of nonmetallic quarternary ammonium salt is specifically mentioned as a thing with the desirable following.

[Formula 2]



Moreover, the cation of metal content quarternary ammonium salt is specifically mentioned as a thing with the desirable following.

[Formula 3]



[0020] As concrete nonmetallic quarternary ammonium salt, they are BONTORON P-51 (product made from Orient Chemical industry) which is quarternary ammonium salt of naphtholsulfonic acid, TP-4040 (Hodogaya Chemical Co., Ltd. make), and the copy charge PSY, for example. Commercial elegance, such as UP2038 (Hoechst A.G. make) and LRA-901 (Japan Carlit Co., Ltd. make), is mentioned as a desirable thing. Moreover, as metal content quarternary ammonium salt, commercial elegance, such as TP-302 which are quarternary ammonium salt of a molybdic acid, and TP-415 (all are the Hodogaya Chemical Co., Ltd. make), is mentioned as a desirable thing. In addition, there are BONTORON N-01 (azine compound : product made from Orient Chemical industry) which is right electrification nature as other electrification control agents, BONTORON N-04 (resin denaturation azine compound : product made from Orient Chemical industry), BONTORON N-07 (azine compound : product made from Orient Chemical industry), copy blue PR (triphenylmethane-color derivative : Hoechst A.G. make), etc., and these can be used together in the range which does not have trouble in a color tone, an electrification property, etc. Moreover, BONTORON S-34 (metal-containing azo compound : product made from Orient Chemical industry) which is negative electrification nature as other electrification control agents,

BONTORON S-44 (metal-containing azo compound : product made from Orient Chemical industry), BONTORON S-54 (metal-containing azo compound : product made from Orient Chemical industry), BONTORON E-84 (salicylic-acid system metal complex : product made from Orient Chemical industry), It can use together in the range BONTORON E-88 (salicylic-acid system metal complex : product made from Orient Chemical industry), BONTORON E-89 (phenol system condensate : product made from Orient Chemical industry), etc. do not have [range] trouble in a color tone, an electrification property, etc. By the case, there is technique, such as a method of making it adhering to a toner surface in the method of making oneself devoting to the method of carrying out melting kneading of all or its part for one-sort or 2 sorts or more of electrification control agent in a coloring agent inside a toner at the method of making a toner containing the electrification control agent used by this invention, and making it containing, and a toner surface layer by high BURITAIZA etc., and *(ing) outside, a Henschel mixer, etc., and *(ing) outside,

[0021] Various coloring agents are used for the color toner of this invention. Specifically The chrome yellow, cadmium yellow, a Synthetic Ochre, a Titanium Yellow, chrome yellow, Naphthol yellow, a Hansa Yellow, pigment yellow, benzidine yellow, Yellow coloring agents, such as a permanent yellow and quinoline yellow lake and ANSURA pyrimidine yellow, A permanent orange and molybdenum orange, the Balkan Peninsula first orange, Orange coloring agents, such as a benzine orange and an indanthrene brilliant orange, Browning agents, such as an iron oxide, umber, and permanent Brown, red ocher, Rose red ocher, antimony, a Permanent Red, fire red, A brilliant carmine, a light fast red toner, permanent carmine, Pyrazolone red, Bordeaux, helio bordeaux, a rhodamine lake, E. I. du Pont de Nemours oil red, thioindigo red, thioindigo MARUN, Red coloring agents, such as Watchung-Red strontium, cobalt purple, first violet, Purple coloring agents, such as dioxazine violet and a Violet Lake, A methylene blue, aniline blue, cobalt blue, cerulean blue, A KARUKO oil blue, a non-metal copper phthalocyanine blue, a copper phthalocyanine blue, Blue coloring agents, such as ultra marine blue, indanthrene blue, and indigo, A chrome green, a cobalt green, the pigment green B, a green gold, Metal oxide powder, such as pigments, such as green stain agents, such as a Phthalocyanine Green, malachite green oxalate, and a poly chromium from copper phthalocyanine, or a color, titanium oxide, and a zinc oxide, is used. As for the amount of a coloring agent, it is desirable that it is 0.1 - 15 % of the weight to the total amount of a toner.

[0022] As for the toner of this invention, it is desirable to contain a polyolefine further. As a polyolefine, although the polymer of olefin monomers, such as ethylene, a propylene, a butene, a pentene, a hexene, a heptene, an octene, a nonene, decene, a 3-methyl-1-butene, a 3-methyl-2-pentene, and a 3-propyl-5-methyl-2-hexene, or the aforementioned olefin monomer, and a copolymer with an acrylic acid, a methacrylic acid, vinyl acetate, etc. correspond, especially polypropylene is desirable. As for especially these, it is desirable to be blended one to 5% of the weight 0.5 to 10% of the weight into a toner. At less than 0.5 % of the weight, there is an inclination to be inferior to fixing properties, such as offset in fixing intensity and a heat roll fixing method. Since the fluidity of a toner is inferior on the other hand when exceeding 10 % of the weight, picture quality deteriorates by poor developer flow, or it is easy to generate problems, like material causes stay within the hold container of a toner and a developer.

[0023] Other compounds are made to contain if needed by the toner of this invention. As other compounds, the lower-alcohol ester of fatty acids, such as a butyl stearate and a stearin acid propyl The polyhydric-alcohol ester of fatty acids, such as a caster wax (product made from Ito Oil Mill), and a diamond wax (New Japan Chemical Co., Ltd. make) Palm aceti (Nippon Oil & Fats Co., Ltd. make), the Hoechst wax E, Hoechst wax - OP (Hoechst acouchi en gesellschaft company make), The higher-alcohol ester of fatty acids, such as carnauba wax, a BISUAMA id blast flow (Nitto Chemical Industry Co., Ltd. make), Alkylene screw fatty-acid amide compounds, such as the flax id 6L, 7S, and 6H (product made from **** Fine chemicals), and the Hoechst wax C (Hoechst acouchi en gel shaft company make), The weight average molecular weight of NIPPORU NBR, 2057S and 2007J, and BR1220 grade has 50,000 or more diene system resins, a hydroxyl content vinyl system resin, a carboxyl group content vinyl system resin, etc. These compounds can add the duty which tunes the electrification nature and fixing nature of a toner finely, or improves the life of a photo conductor or a

toner in 0 - 10% of the weight of an amount into nothing and a toner.

[0024] Let other compounds added if needed [a binding resin, an electrification control agent, a coloring agent, and if needed] for more than be toners through a homogenization process. For example, after blending the above-mentioned component dryly by the Henschel mixer, micro mixture in the melting state is performed by the kneader, and the kneading object subsequently cooled is pulverized with a pin mill, a jet mill, etc., and it considers as the toner of 7-15 micrometers of mean particle diameters preferably especially 5-30 micrometers of mean particle diameters. The above-mentioned toner or a binding resin, and a coloring agent can be used as a toner parent, and external addition mixture (outside **) of the other additives can also be further carried out to the color toner of this invention. For example, one or more kinds of magnetic powder can be made to contain within limits which do not change a color tone into a surface. As this magnetic powder, various ferrites, such as an iron ferrite, a copper-zinc ferrite, a barium-nickel ferrite, a nickel zinc ferrite, a manganese zinc ferrite, a lithium-zinc ferrite, a magnesium-zinc-copper ferrite, and a barium-copper-zinc ferrite, are desirable, and it is desirable to add dispersibility improvers, such as a fatty-acid derivative or a metal salt, on the front face of the magnetic powder if needed in metal powders, such as iron, manganese, nickel, and cobalt, or the end of a

[0025] Moreover, a silica impalpable powder can be used for inner ** or outside ** as other additives. Especially when using a silica impalpable powder, it is desirable to carry out addition mixture 0.2 to 0.8% of the weight 0.1 to 1% of the weight to a toner parent. A silica impalpable powder is in the inclination for the sharp pod fogging of a picture to be inferior at less than 0.1 % of the weight, when it exceeds 1 % of the weight, repeatedly, the picture concentration at the time of use falls, or there is an inclination for fixing intensity to fall. As the above-mentioned silica impalpable powder, the hydrophobic-property-sized silica impalpable powder is the optimal. Such a silica impalpable powder the impalpable powder of the silicon dioxide from which the surface silicon atom is a silanol group For example, an octyl trichlorosilane, a decyltrichlorosilane, a nonyl trichlorosilane, 4-isopropyl phenyl chlorosilane, a 4-tert-buthylphenyl chlorosilane, A dimethyldichlorosilane, dipentyl dichlorosilane, dihexyl dichlorosilane, Dioctyl dichlorosilane, dinonyl dichlorosilane, JIDESHIRU dichlorosilane, Didodecyl dichlorosilane, 4-tert-buthylphenyl dichlorosilane, JIDESE nil dichlorosilane, G 2-ethylhexyl dichlorosilane, G 3, 3-dimethyl pentyl dichlorosilane, a trimethylchlorosilane, By making it react with compounds, such as a trihexyl chlorosilane, a tridecyl chlorosilane, a dioctyl chlorosilane, an octyl dimethyl chlorosilane, and 4-isopropyl phenyl diethyl chlorosilane A hydrophobic radical is combined with the surface silicon atom of a silicon-dioxide particle through an oxygen atom. As for these silica impalpable powders, what has the mean particle diameter of a primary particle in less than [30mmicro] is desirable in respect of protection of a photo conductor. as such a silica impalpable powder -- Aerosil R972, a silica D-17, T-805, R-812, RA200H, RX-C (above, product made from Japanese Aerosil), and a tare -- NOx 500 (product made from TARUKO), Cab-O-Sil, M-5, and MS- 7, MS-75, HS-5, EH-5, S-17, TS-720 (above, Cabot Corp. make), etc. are marketed

[0026] Moreover, in order to raise properties, such as a photo conductor and a life of a developer, as other additives, a fatty-acid metal salt can be used. As a fatty-acid metal salt, a salt with saturation or the metal salt of unsaturated fatty acid, for example, a maleic acid, stearin acid, oleic acid, a palmitic acid, a RENORU acid, a ricinoleic acid or ricinoleic acid, zinc and magnesium, calcium, lead, iron, nickel, cobalt, copper, or aluminum etc. is mentioned, and a zinc stearate, an aluminum stearate, a calcium stearate, and a magnesium stearate can use it preferably especially. As for especially a fatty-acid metal salt, it is desirable to carry out addition mixture 0.01 to 0.2% of the weight 0.01 to 0.5% of the weight to a toner parent. When a fatty-acid metal salt is [a photo conductor] an organic photo conductor at less than 0.01 % of the weight, a bird clapper is especially in a short life. On the other hand, if it exceeds 0.5 % of the weight, the fluidity of a toner will fall, or it is in the inclination for a toner to become easy to adhere in a photo conductor or a developing machine.

[0027] Furthermore, other additives can be further added to the toner of this invention if needed. As an additive to apply, there are particles, such as an aluminum oxide, a zinc oxide, titanium oxide, a calcium carbonate, and a polymethyl methacrylate, etc. Mixed processing is carried out by the V shaped rotary

mixer, the Henschel mixer, the turbular mixer, high BURITAIZA, etc., and the additive of others which are added to a toner parent if needed is held at a toner parent. Let the toner for electrostatic-charge image development obtained as mentioned above be the developer of this invention combining a carrier.

[0028] as a configuration, although a true globular shape, ** globular shape, flat top, and sponge-like thing can use ferrite carriers, such as a brown iron oxide, iron, copper, zinc, lead, magnesium, a lithium, manganese, cobalt, nickel, and barium, etc. as the quality of the material, this carrier has few loads to a developing machine, and its quality of image is good -- etc. etc. -- as for the quality of the material of a reason to a carrier, it is desirable that they are a ferrite or a magnetite, and it is especially desirable. Moreover, what covered the front face with the resin is preferably applied by making the above-mentioned ferrite or a magnetite into a core material. Since this resin clothing carrier is excellent in the standup nature of electrification, does not have weld with the carrier front face of the toner in repeat use and can maintain a proper electrification function, it is desirable. Moreover, since the problem that the color toner which the amount of carrier charges was accumulated by use and held at the carrier side becomes is hard to be developed, and picture concentration becomes thin is solvable, as a resin to cover, a silicone system resin, an acrylic resin, and a fluorine system resin are desirable, and a fluorine system resin is especially desirable also in this.

[0029] Moreover, as for the developer of this invention, it is desirable that the electrical resistivity measured with the equipment explained by drawing 1 is especially adjusted to $5 \times 10^8 - 2.5 \times 10^{10}$ ohm-cm 1×10^8 to 3×10^{10} ohm-cm. Thus, it is desirable that electric resistance regulators, such as carbon black, various metal powders, and a surfactant, etc. are mixed by the covering resin in order to adjust electrical resistivity, and covering of a material carrier is presented. It is easy to produce the edge effect from which electrification nature with it is hard to obtain the electrical resistivity of a developer here, it will be easy to become low picture concentration if it is hard to reappear well and a halftone and a thin-line picture exceed ohm [3×10^{10}] and cm, and only a picture periphery becomes high picture concentration, and a center section becomes low picture concentration conversely. [a large disclosure of a charge and] [stable in less than 10^8 ohm-cm] As for especially the mixing ratio of the toner in a developer, it is desirable to carry out to 1 - 7% of the weight one to 10% of the weight to the total amount of a toner and a carrier. At less than 1 % of the weight, the concentration of printed matter is thin or it is easy to generate the so-called carrier stick with which a carrier adheres to a photo conductor. On the other hand, when it exceeds 10 % of the weight, scattering of a toner is conspicuous, and the quality of printed matter is reduced or it is in the inclination which pollutes a work environment.

[0030] In the picture manufacture method of this invention, it can be established and the target picture can be manufactured, after developing the electrostatic latent image formed on the photo conductor with the color toner of this invention, or the developer of this invention and imprinting it subsequently to base materials, such as paper. In the picture manufacture method of this invention, its matching with a developer is good, and since the thing which contains the amorphous metal photoconductivity matter as a photo conductor, especially the thing whose it is a selenium can maintain picture quality over a long period of time, they are desirable. Moreover, in the high-speed development process which the peripheral speed of a photo conductor rotates with the peripheral speed of 20cm/second or more, the picture manufacture method of this invention shows the difference with the conventional method notably.

[0031]

[Example] Although this invention is explained in full detail according to an example below, this invention is not limited to this.

The monomer and polymerization initiator which are shown in the 87-92-degree C reaction container which held the moisture powder medium 3,000 weight section which carried out micro distribution of the hydroxyapatite (super tightness 10, product made from Japanese Synthetic chemistry) 100 weight section by which 10 % of the weight moisture powder of examples 1-6 and example 1-4 (1) vinyl system resin of comparison R-1-R-manufactures of 3 was carried out under a nitrogen air current in Table 1 were held for after [the dissolution] preparation about 6 hours. Once cooling temperature to 40 degrees C after that, the monomer and polymerization initiator which are shown in Table 2 were taught,

and it held at 87-92 degrees C for about 4 hours, it held above 96 more degrees C for 10 hours, and the polymerization was completed substantially. After cooling, filtration hot air drying was washed and carried out in hydrochloric-acid solution, and the vinyl system resin was obtained. The property of a vinyl system resin is shown in Table 3.

[0032]

[Table 1]

表 1 (配合量の単位は重量部)

共 重 合 体	R-1	R-2	R-3
スチレン	530	530	470
メタクリル酸ブチル	-	-	200
アクリル酸ブチル	120	120	-
α -メチルスチレンダイマー	6	-	-
TP-8 ^{*1}	-	-	1
ベンゾイルパーオキシド	30	30	20

*1 TP-8 : 日曹油化 (株) 製 2-エチルヘキシル (3-メルカプトプロピオネート)

[0033]

[Table 2]

表 2 (配合量の単位は重量部)

共 重 合 体	R-1	R-2	R-3
スチレン	300	300	200
メタクリル酸ブチル	-	-	130
アクリル酸ブチル	50	50	-
マレイン酸ジブチル	10	-	-
フマル酸ジブチル	-	-	10
ジビニルベンゼン	1	-	1.7
1,1-ビス(4-ブチルパーオキシ)3,3,5-トリメチルシクロヘキサン	5	5	5

[0034]

[Table 3]

表 3

共 重 合 体	R-1	R-2	R-3
分子量1000以下に ^{*2} 対応する化合物の含有量	6.1	0.6	5.1
分子量1000以下に ^{*2} 対応する化合物のピーク点	110	-	110
(Mw) / (Mn) ^{*2}	30	5	30

*2 ゲルパーミエーションクロマトグラフィー法、テトラヒドロフランで分取したトナーの標準ポリスチレン検量線を作成し換算、以下の実施例でも同様。なお樹脂の記載した物件はトナー中での樹脂の状態にあわせるため、PCM-30 (池貝機販(株)製) 混練機にて、スクリュウ回転数：200rpm、軸温度：110℃、130℃、140℃、140℃、フィード量：60で1度混練した値。これにより分子量1000以下の成分の量はほとんど変化しない。

[0035] (2) After carrying out preliminary mixture of the toner material (the unit of loadings is weight %) shown in the manufacture table 4 of a toner by the Henschel mixer collectively, melting kneading was

carried out by the 2 shaft kneader. Subsequently, the toner of 10-12 micrometers of mean particle diameters was obtained for the cooled kneading object with the pin mill and the jet mill.

(3) The laser beam printer carrying the amorphous selenium photo conductor estimated the picture using 4000g of developers which consist of a toner shown in the (Evaluation a) evaluation method table 4, and a carrier. A photo conductor is written in by corotron, information is written in in about 700 V by the helium neon laser after electrification, reversal development of this is carried out by the magnetic brush method, and it is established with a heat roll after that. The peripheral speed of a photo conductor carried and evaluated 32cm/[a second and] and the development gap by 1.3mm and the iron powder carrier to the printer set to 3.5mm on the ferrite carrier. Printing was performed under 20 degrees C and the environment of 40% of relative humidity. The heat roll temperature under printing is 190 degrees C.

[0036] (b) Fixing on-the-strength fixing intensity was computed by the following formula.

[Equation 1]

$$\text{定着強度(\%)} = \text{テープ剥離後の画像濃度} \div \text{テープ剥離前の画像濃度} \times 100$$

(c) Picture concentration (O. D), the fogging, and halftone picture concentration (O. D) and a fogging were measured using the Macbeth reflection density meter RD514 type (product made from A divisionkollmorgen Corp.). The grade of reappearance of a halftone was judged by viewing. The error criterion of halftone repeatability is as follows.

O : the grade of scattering of a toner was judged by (d) scattering viewing out of which x:halftone with the thin **:some halftone from which a good halftone image is obtained does not come. The error criterion of scattering of a toner is as follows.

O : the electrical resistivity of the electrical resistivity developer of the x:(e) developer with which **:little scattering which does not almost have scattering is accepted was measured using the measuring device of drawing 1. [as which many scattering is regarded] In addition, (1) of drawing 1 shows the composition of a measuring device, and (2) shows a representative circuit schematic. 800g was taught to the measurement cell 2 for the developer 4, the ear of a developer was formed on the magnet roll 1, the counterelectrode 3 was connected to the magnet roll, the closed circuit was built, direct current voltage was impressed to this closed circuit, and it asked for the electrical resistivity of a developer by the following formula.

[Equation 2]

$$\rho_c = R \cdot S / l$$

ここで ρ_c : 現像剤の電気抵抗率 ($\Omega \cdot \text{cm}$)
 R : 現像剤の抵抗値 (Ω)
 S : 対向電極との接触面積 2.7cm²
 l : 現像剤層厚み 0.45cm

[0037]

[Table 4]

表 4

			実 施 例						比 較 例			
			1	2	3	4	5	6	1	2	3	4
現 像 剤			G-1	G-2	G-3	G-4	G-5	G-6	G-7	G-8	G-9	G-10
トナ ー (組成)	樹 脂	R-1	93	93	—	93	93	93	—	93	93	—
		R-2	—	—	—	—	—	—	93	—	—	92
		R-3	—	—	92.6	—	—	—	—	—	—	—
	帯電制御剤	TP-302*3	0.5	0.5	0.6	0.5	0.5	—	1.5	2.0	—	—
		TP-415*3	0.5	0.5	0.6	0.5	0.5	1.0	—	—	—	—
		ポントロンP-51*4	1.0	1.0	1.2	1.0	1.0	1.0	0.5	—	2.5	1.5
		オイルブラックBY*5	—	—	—	—	—	—	—	—	—	1.5
	着色剤	FG-7350*6	3	3	3	3	3	3	3	3	3	3
	離型剤	TP-32*7	2	2	2	2	2	2	2	2	2	2
キ ャ リ ア			C-1*8	○	○	○	—	—	○	—	—	—
			C-2*9	—	—	—	○	—	○	○	○	—
			C-3*10	—	—	—	—	○	—	—	—	○
ト ナ ー 濃 度			4	5	4	4	4	4	4	4	4	4

*3 保土谷化学(株)製、帯電制御剤

*4 オリエント化学(株)製、帯電制御剤

*5 オリエント化学(株)製、帯電制御剤

*6 東洋インキ(株)製、青色顔料

*7 三洋化成(株)製、ポリプロピレンワックス(ハイマ TP-32)

*8 フッ素樹脂コートフェライトキャリア(F-883-100 パウダーテック製)

*9 ノンコートフェライトキャリア(F-100 パウダーテック製)

*10 ノンコート鉄粉キャリア(TSV-200 パウダーテック製)

[0038]

[Table 5]

表 5

		実 施 例						比 較 例			
		1	2	3	4	5	6	1	2	3	4
現 像 剤		G-1	G-2	G-3	G-4	G-5	G-6	G-7	G-8	G-9	G-10
定 着 強 度		87	84	90	86	80	83	65	85	82	60
初 期	O. D	1.2	1.3	1.3	1.1	1.3	1.3	1.3	1.3	1.2	1.3
	かぶり	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.1
	飛 散	○	○	○	○	○	○	○	×	○	○
	色 目	輝 青	輝 青	輝 青	輝 青	輝 青	輝 青	輝 青	輝 青	輝 青	暗 青
	ハーフトーン	○	○	○	○	△	○	○	○	○	△
	電気抵抗率 ($\times 10^3 \Omega \text{cm}$)	1.3	1.7	1.4	1.0	0.08	1.4	0.8	0.6	1.3	0.08
40万頁	O. D	1.0	1.1	1.1	1.1	1.1	1.0	0.8	—	1.2	—
	かぶり	0.1	0.1	0.1	0.1	0.1	0.1	0.2	中止*11	0.2	中止*12
	飛 散	○	○	○	○	○	○	○	—	×	—
	ハーフトーン	○	○	○	○	△	○	○	—	△	—

*11 初期から飛散が劣悪のため連続印刷は中止した。

*12 画像の色調が暗青色で、カラートナーとして不適であった。

Except having used the ultra high-speed laser beam printer whose peripheral speed of an example 7 selenium photo conductor is about 80cm/second, when carried out like the example 1, it was as good as

scattering [1 or 800,000 pages after fogging 0 after picture concentration of 1.0 or 800,000 pages after initial picture concentration 1.2, initial fogging 0.1, initial scattering O, initial halftone O, and 800,000 pages.] O, and halftone O after 800,000 pages.

[0039]

[Effect of the Invention] The color toner and developer of this invention are excellent in picture quality and fixing properties, such as picture concentration and a fogging, and can maintain the color picture which toner scattering does not generate also in high-speed printing or prolonged repeat use so that clearly from the above result.

[Translation done.]